

# **US ATLAS SCT Barrel Module Assembly: I-V Probing Procedure V2.0 15-July-2002**

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## Revision History:

V1.0 April 10, 2002 Original Version

V2.0 July 17, 2002 Reformat, changes for post qualification period.

## **1. Overview**

These tests consist of measuring the leakage current vs. increasing voltage. Testing is done in a light-tight enclosure. A voltage source/pico-ammeter (Keithley 487) imposes a voltage across the detector in the box. The resulting current is then read by the ammeter and recorded. The v/ammeter is controlled by a computer running a LabVIEW program, which sweeps through predefined bias voltage points. This generates a data file, which is stored for further comparison. In some cases the measurements may be on a single detector but in general the measurements are done on 4 detector/baseboard assemblies.

## **2. Initial setup**

Turn on the camera power supply. Nominal readings are 0.2A @12VDC

Turn on the camera lighting to about halfway between low and high.

The camera can be moved independently from the chuck, and this allows sighting on the bias access port without moving the detector.

Set the camera magnification to 1x by rotating the black lens housing fully CCW.

Focus on the chuck surface by using the coarse and fine camera Z-stage movement controls on the tower.

Center the camera on the right side of the stage, using the camera tower X-stage controls.

## **3. Placing the detector on the vacuum chuck in the dark box.**

Because of the large size of the detector relative to the chuck, the detector must be substantially offset to the right or left of chuck center. This results in an overhanging detector, without full vacuum engagement, and extreme care is called for.

Move the chuck to the full right position using the chuck X-stage controls.

Carefully place the detector face-up on the chuck surface. Focus the camera on the detector surface.

Position the wafer so the bias ring access port is centered in the camera field-of-view.

Very carefully move it sideways until the bias ring access port can be seen in the camera field-of-view.

Turn on the chuck vacuum while supporting the detector.

Now move the probe needle to a position above the detector. A fuzzy shadow should be visible on the target area of the detector.

Turn the Z-axis control of the probe CCW to lower the probe needle (warning! this is reversed from the intuitive feeling with normal RH thread systems).

The shadow will coalesce into a sharper image as the needle lowers to the detector surface.

Stop turning the Z-axis control momentarily when the needle touches the surface.

If the alignment of the needle with in the access port looks good, slowly turn the Z-axis control about ½ to 1 turn more. The needle should skid slightly and then furrow into the pad surface.

Turn the camera light off, and close the dark box by pulling down on the center of the door. The door will go over-center, and attempt to close itself within about 1 foot of bottom edge contact. Don't let it slam. Latch the top first, bottom second.

#### **4. Running an V/I scan**

Select the LabVIEW program C:\Documents and Settings\Administrator\Desktop\487 control\487controller.vi.

The Users Guide is in:

C:\Documents and Settings\Administrator\Desktop\487 control\487 Labview documentation.doc

Enter the detector serial number.

Check the electrical test parameters.

Enter the dark box temperature from the SDT46 digital thermometer.

Press the Plot I (V) button to begin the scan. Cycle time is approx. 15 seconds.

After scan is complete, press the Print I (V) button to generate a data line hardcopy. Save the data also in the SCT database format.

### **5. Post detector-to-baseboard gluing leakage test**

Each detector is tested after gluing the 4 crystals to the baseboard assembly. This is the same test electrically as a single detector measurement, but has a different mechanical setup to accommodate the assembly form factor. Principally, the detector ass'y needs to support and measured in a holding fixture. There are two holding fixture styles, front or back (facing up). Only two detectors can be tested in each fixture, so both must be used sequentially to test a full assembly. Two needle probes must be used, one to contact the detector test pad, and an extra one to contact the detector backplane. Two different contact schemes must be used to make the backplane connection. The backplane of front detectors are accessible via a gold metal pad on the baseboard ass'y. The gold pad is not accessible when the detector ass'y is inverted to measure the back detectors. The contact must be made on the backplane of the front detectors, which is visible when the detector ass'y is inverted. This is visible as a long, narrow triangular region below the back detector.

### **6. Post hybrid-to-module gluing leakage test**

This step may not be used in all cases. Each detector is tested after the hybrid is bonded to the baseboard assembly. This is the same type of test electrically, but has a slightly different mechanical setup to accommodate the assembly form factor.